A.31 Soft Bird's-Beak (*Cordylanthus mollis ssp. mollis*)

A.31.1 Legal Status

Soft bird's-beak (*Cordylanthus mollis* ssp. *mollis*) is listed as endangered under the Federal Endangered Species Act (November 1997) and listed as rare under the California Native Plant Protection Act (July 1979). Its Heritage Ranking in the California Natural Diversity Database is G2T1/S1.1, which means that globally (G) this species has either between six to 20 viable element occurrences, 1,000 to 3,000 individuals, or 2,000 to 10,000 acres of occupied habitat. In contrast, this particular subspecies has been ranked as threatened globally and within the state (S) as it has either less than six viable element occurrences, less than 1,000 individuals, or less than 2,000 acres of occupied habitat. Its state threat level rank is "threatened."

The California Native Plant Society (CNPS) List ranking of 1B.2 for soft bird's-beak indicates that it is rare, threatened, or endangered in California and elsewhere, and is considered by CNPS to be fairly endangered in California with between 20 to 80 percent of occurrences threatened. Plants with a List rank of 1B are considered by the California Native Plant Society to meet the definitions of Section 1901, Chapter 10 (Native Plant Protection Act) or Sections 2062 and 2067 (California Endangered Species Act) of the California Fish and Game Code.

USFWS recently designated critical habitat that specifies the protection of soft bird's-beak populations in the four areas that contain the largest and most intact populations and habitat (71 FR 67089). None of the designated critical habitat is within the BDCP Planning Area.

A.31.2 Species Distribution and Status

Range and Status

Historically, the range of soft bird's-beak extended from tidal marshes of Napa and Solano counties in the north, Contra Costa County in the south, Sonoma and Marin counties in the west, and Sacramento and San Joaquin counties in the east (Figure A.31.1). It is now believed extirpated from Marin, San Joaquin, and Sonoma Counties, and extant in Napa, Solano, Contra Costa, and Sacramento Counties (CNDDB 2008). The largest extant occurrences are on California Department of Fish and Game reserves and wildlife areas, a California Department of Parks and Recreation park, a county park, and a property held for conservation purposes by a land trust.

Distribution and Status in the Planning Area

A single occurrence has been reported in the BDCP Planning Area in Sacramento County along the north bank of the San Joaquin River immediately west of the Antioch Bridge (CNDDB 2008) (Figure A.31.2). This occurrence was last observed in 1972 and may have been extirpated, but there are no additional data describing the site which aerial photographs now show to be a rip-rapped shoreline. No voucher specimen for this occurrence is on record at any California herbarium (Consortium of California Herbaria 2008).

Source: California Department of Fish and Game, CNDDB, 2008.
Consortium of California Herbaria, 2008.

Figure A.31.1. Soft Bird's Beak Statewide Recorded Occurrences

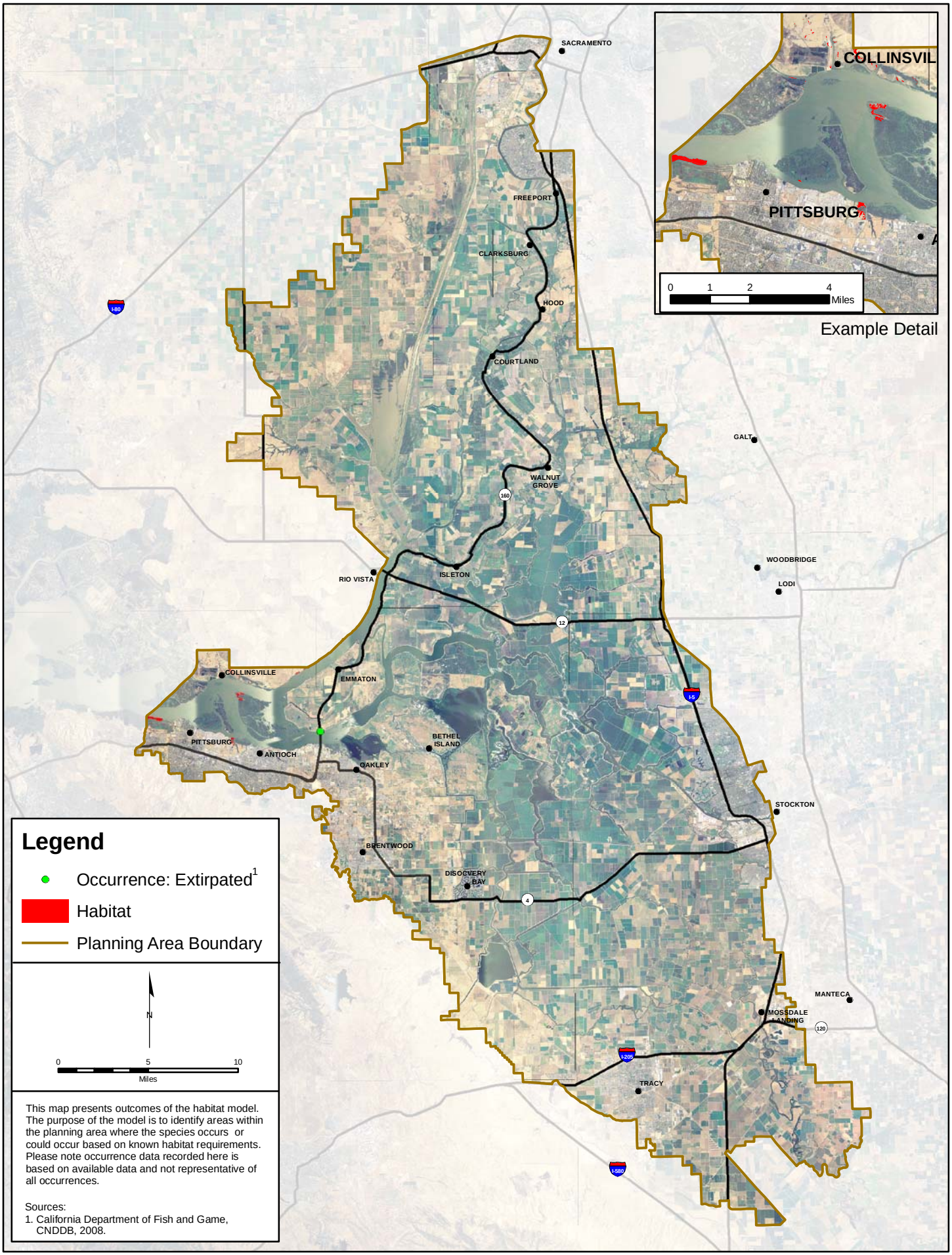

Figure A.31.2. Soft-Bird's Beak Habitat Model and Recorded Occurrences

A.31.3 Habitat Requirements and Special Considerations

Soft bird's-beak grows at the lower margin of tidal brackish high marshes in the San Francisco Estuary (Baye et al. 2000, Grewell 2005, Grewell et al. 2007). Where the topography is relatively uniform, soft bird's-beak is distributed in bands at the lower margin of the brackish high marsh. Where the topography is more complex, such as along tidal creeks, areas with some relief such as ridges or mounds, and on levees soft bird's-beak can be found in a variety of patch shapes (Baye et al. 2000, Grewell 2005, Grewell et al. 2007). The distribution of these patches and the distribution of individual plants within the patches is controlled by a number of factors including: the existence of a persistent seed bank; the dispersal and germination dynamics of its floating seed; the extent of bare soil where seedlings can establish; the presence of appropriate long-lived annual or perennial host species, and; the absence of dense populations of large, perennial, non-native plant species (Baye et al. 2000, Grewell et al. 2003, Grewell 2005, Grewell et al. 2007). The presence of a natural tidal inundation pattern is important and the more muted the tidal influence is, such as tidal creeks with salt water exclusion gates or marshes with extensive levee systems, the less valuable the habitat is for soft bird's beak (Grewell et al. 2003, Grewell 2005, Grewell et al. 2007). A number of hypotheses have been suggested to explain the effects of the muted tidal influence including: increased rates of seed predation and herbivory by native insects; high densities of inappropriate host species such as non-native annual plants, and; invasion and space preemption by large non-native plant species such as perennial pepperweed (*Lepidium latifolium*) (Grewell 2005).

Dominant plant associates include pickleweed (*Salicornia virginica*), saltgrass (*Distichlis spicata)*, salt marsh dodder (*Cuscuta salina*), and spearscale (*Atriplex triangularis*) (Baye et al. 2000, Grewell 2005, Grewell et al. 2007). Recent research in an analogous plant community has documented complex positive and negative ecological relationships between the related Point Reyes bird's-beak (*Cordylanthus maritimus ssp. palustris*), salt marsh dodder, and other species including pickleweed (Grewell 2008), but these findings have not been extended to soft bird's-beak.

A.31.4 Life History

Soft bird's-beak is a four- to 12-inch tall annual herb that parasitizes and draws nutrients from other plants through their roots systems (Hickman 1993, Grewell 2005). It may require pollinators such as bumblebees (*Bombus* spp.) or other insects to pollinate its flowers and produce viable seed but is apparently capable of producing seed without the movement of pollen by insects (Grewell et al. 2003, Grewell 2005). It appears to have a persistent seed bank and specific seed germination cues. Complex interactions between its seed germination characteristics, which respond to variable environmental factors, the lack or presence of bare soil for seedling establishment, and the presence or absence of appropriate host species can result in large annual changes in population sizes (Grewell 2005). Its seeds float and are dispersed by water, which is likely to aid its spread and reestablishment (Grewell 2005).

A.31.5 Threats and Stressors

Threats to the species include the destruction of habitat, the elimination or muting of tidal regimes, overgrazing and trampling by live stock, rooting by feral pigs, invasion of habitat by non-native annual plants that are inappropriate hosts, and invasion of its habitat by perennial pepperweed (Grewell et al. 2003, Grewell 2005, Fiedler et al 2007, CNDDB 2008).

A.31.6 Relevant Conservation Efforts

Soft bird's-beak occurs on a number of government lands where is it protected from development, but sometimes impacted by lawful site use and management activities (Grewell 2005, USFWS 2007). At the Rush Ranch site, which is owned by the Solano Land Trust and protected by a conservation easement, marsh restoration was coupled with the reintroduction of soft bird's-beak through a high density seeding in 2000 (Grewell et al. 2003, Grewell 2005). It is unclear if this reintroduction has been successful as the 2004 census reported a substantial increase in the number of plants in the population but each plant was significantly smaller than a nearby natural population and the number of seeds produced by each plant had declined from 2000 per plant to near zero (Grewell 2005).

The CALFED Bay-Delta Ecosystem Restoration Program Plan's Multi-Species Conservation Strategy (MSCS) designates the soft bird's-beak as "Recovery" (CALFED Bay-Delta Program 2000). This means that CALFED has established a goal to recover the species. Recovery is equivalent to the requirements of delisting a species under federal and State ESAs.

Soft bird's-beak is proposed for coverage under the Solano County Habitat Conservation Plan.

A.31.7 Species Habitat Suitability Model

Habitat. Vegetation types designated as species habitat in this model correspond to the mapped vegetation associations in the BDCP GIS vegetation data layer. Soft bird's-beak occurs west of the Antioch Bridge in specific plant community associations that include: *Distichlis spicata*-annual grasses, *Distichlis spicata-Juncus balticus*, *Distichlis spicata-Salicornia virginica*, Pickleweed (*Salicornia virginica*), *Salicornia virginica-Cotula coronopifolia*, and *Salicornia virginica-Distichlis spicata*.

Assumptions. Historical and current records of this species indicate that its distribution is limited to areas of the BDCP Planning Area that are west of the Antioch Bridge (Figure A.31.2) (CNDDB 2008). Soft bird's-beak grows at the lower margin of tidal brackish high marshes in the San Francisco Estuary (Baye et al. 2000, Grewell 2005, Grewell et al. 2007). Where the topography is relatively uniform, soft bird's-beak is distributed in bands at the lower margin of the brackish high marsh. Where the topography is more complex, such as along tidal creeks, areas with some relief such as ridges or mounds, and on levees soft bird's-beak can be found in a variety of patch shapes (Baye et al. 2000, Grewell 2005, Grewell et al. 2007). Dominant plant associates include pickleweed (*Salicornia virginica*), saltgrass (*Distichlis spicata)*, salt marsh dodder (*Cuscuta salina*), and spearscale (*Atriplex triangularis*) (Baye et al. 2000, Grewell 2005, Grewell et al. 2007).

A.31.8 Recovery Goals

Soft bird's-beak is federally listed as endangered but no recovery plan has been developed.

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